THE MUSMEE AT HOME.

HOW SHE DRESSES AND HOW HER DRESS-GOODS ARE MADE.

Yokohama, December 12.

If any more Arnolds and Lotis and Lafcadio Hearns come to Japan, there is a probability that the American girl, who has long reigned supreme as the ideal of femininity, will be unceremoniously deprived of her throne in favor of the small, brown, soft-voiced maiden from the Land of the Rising Sun. Travellers find nothing in this delightful country half so fascinating as its daughters. They have been slaves and unpaid servants of their masculine relatives for centuries, but now they are coming to appreciate themselves, which is always a first step toward being appreciated. It must be somewhat of a surprise to the Japanese men, if any of them read Sir Edwin Arnold's charming book, "Japonica," to learn that the despised women are considered "so amazingly superior to their men-folk as almost to belong morally and socially to a higher race." It is to be hoped that this sudden rise to prosperity will not spoil these charming beings, and turn them into conventional and uninteresting counterparts of their European sisters.

One change will undoubtedly be made, and that is in matters of dress. The Court ladies even now patronize Worth and Redfern, and it will not be many years before the infection reaches the "lower classes." It is affirmed that the adoption of Paris gowns has worked a decided reform in the attitude assumed toward the wearer by her lord, but from an artistic point of view the loss is great. Imagine substituting a bell skirt and a tight waist for a silk-embroidered kimono tied around with an obi! This picturesque garment is long and loose, and open to the hem. It folds across the breast with a surplice effect, and is kept in place by a wide sash. A soft handkerchief is folded in the heart-shaped neck, and when the little lady is ready for the street a cord is tied around her hips to hold up her gown, which is always about a foot upon the floor. The sash and the handchief are usually of silk and elaborately painted or embroidered. The kimono is made of velvet, brocade, silk, and commonest of all, crape-cloth, which may be cotton or silk, or a mixture of both. Garments so simple and unvarying in line must needs be highly ornamented to please the most artistic and beauty-loving people in the world. The cheapest materials are stamped with designs so elaborate and colors so many and beautiful as to excite the admiration of the least observant foreigner.

Any one familiar with the details of cloth printing cannot but know that such effects are impossible to obtain from the block and roller system used in our factories. A visit to a crape printing establishment will more than pay any person fortunate enough to be able to sojourn for a time in Japan. I say crape printing, not because the proces differs, but because crape is the favorite material for ordinary wear. It is woven in a peculiar way with two shuttles, three or four shots being given with the thread of one, and an equal number given with the thread of the other, the threads thus forcibly twisted in opposite directions. The cloth is then boiled for some hours with straw ashes, after which it is washed, stretched and dried in the sun. When finished it has shrunk considerably from its original width and has that crinkled, uneven surface which it never loses. From the weaver the crape goes to the printer, or one might almost say the painter, for the workman in this country is less an artisan than an artist.

There is a vision of whirring wheels, stifling hot rooms, pale faces and thin, hard-worked hands when one examines a piece of European cotton. There is no suggestion of toil and poverty in these gay stuffs of Japan. The factories here are small, no more than fifty workmen being employed in the largest. Externally the building is as unlike a factory as possible. There is a small house where the head of the establishment, the owner or manager, receives customers and has his counting-room. Beyond this are the long sheds where the work is done. The buildings are open on three sides and are filled with low, narrow tables, little more, in fact, than boards laid on trestles. On these are stretched the cloths, and the rafters above are hung with stuffs partly printed or drying. Before the work can be completed. Men and boys bend over the tables at work. They wear short breeches and blue cotton blouses, stamped across the back with the trade mark or seal of the master. The entire machinery is comprised in a few stencil plates, round brushes and saucers of paint.

Out in the garden, with its dwarfed trees and miniature landscapes, the artist of the establishment sits on the ground beside a flowering shrub, and studying its swaying branches and blowing petals, draws new designs, the thousandth variation of an old theme. Birds and clouds and shadows also he watches. From his black and white drawings the stencils are cut, from water-proof paper, by one set of workmen. Let us examine the printing process from the beginning.

The table contains an entire length of cloth tacked firmly to the boards. The workman affixes his first stencil plate and covers it with a quick, even coat of rice paste. This passes through the patterned spaces to the cloth and covers the parts which are to be left white in the design. Passing down the table and using the same stencil, he soon covers the piece of cloth with the white spaces. A series of stencil plates are then applied in turn; one for each color used in the pattern. The process is the same even when the simplest combinations of lines and rings are to be printed. The colors are laid on moist and the deft and affectionate hand of the workman tones and shades and deepens his tints as carefully and conscientiously as though he were preparing a picture for exhibition. In an incredibly short space of time the cloth is covered with the finished pattern of birds or flowers in most naive and artistic arrangements. The better grades of material pass from the printer to the artist, who adds the fine touches, places an accent where it is needed, or corrects a tone or a "value." Many of the most expensive silk crapes are painted entirely by hand, and no two yards of the exquisite stuff will be exactly alike. Some times a little silk embroidery is added to give a richer effect to the painting.

The stuffs are not dyed until after they are printed. The pattern is covered with rice paste which protects it from the dye and is easily washed off, leaving the paint as bright as ever. Vat dying is little used in Japan, as plain colored stuffs are not popular. Vegetable dyes are used almost altogether, and indigo is the favorite color used.

The artist-workmen employed in the cloth printing factories work seven days in the week. They have two holidays out of every month, which is little enough rest, seeing that a working day is eleven hours long. They receive about a dollar and a half a week. The artists and designers get more—perhaps seventy-five cents or a dollar a day. This is not bad pay, considering the cheapness and simplicity of living.

The goods in price compare very favorably with our printed stuffs, and are really superior, both in texture, color and design. A Japanese lady may be very extravagant, of course; she may wear painted velvet, or gold embroidered crape, or brocade worth its weight in gold. But the people of ordinary means are more easily satisfied, and vanity finds its chief expression in sashes and handkerchiefs.

It is impossible to duplicate the commonest prints. The stencil plates are used up in one printing and new designs are being executed every day. A manufacturer would look at you with polite astonishment if you asked for a "repeat" of anything. Did the wind ever blow a blossoming cherry bough across a space of azure in just the same arrangement of lines and color? Did an iris-tinted cloud ever assume the shape of yesterday? Did the sun ever touch the wing of a flying stork with the same light? There are no "repeats" in nature.

The Japanese manufacturer, however, has already begun to look for foreign markets for his beautiful goods, and is anxious to learn the tastes and requirements of the Americans. When he begins to export regularly, one of two things will happen: Hand painting with all its delicate and sympathetic effects will go out forever, or we will get in our markets what we have in porcelain and other art products; not the work of skill and genius, but merely commonplace and second grade "repeats," turned out in quantity expressly for exportation.

BACTERIOLOGY.

THE INFANT SCIENCE.

From The Saturday Review.

In the progress of every science there are necessarily lulls or temporary cessations in the experimental results of investigators, and this is often owing to the difficulty of elucidating certain points which, even though they may not be absolutely necessary, are at any rate desirable to establish in order that the science may be brought to a condition of practical utility. This has been more especially the case with what must still be called the "Infant science"—bacteriology.

The points most requiring elucidation belong to that section of the subject which relates to the investigation of micro-parasites or disease germs. Among all the different varieties of bacteria we know of and can cultivate, the few, comparatively, which will grow in the tissues and blood of living animals afford the most gratifying research results. The changes they bring about in growing constitute disease conditions frequently of definite kinds, caused by one specific germ. The significant fact that these conditions are frequently non-recurrent in the same individual has afforded to bacteriologists a key by which have been opened up certain vistas in the future of prophylaxy which, though still shadowy, are progressive in distinctness and certainty.

Attempts toward ridding the human race of the scourge of infectious disease have been made so far in several different ways. The following are six of the methods which have been employed:

(1) M. Pasteur's simple preventive inoculation, which consists in administering a minute quantity of an "attenuated" or "mitigated" artificial culture of the microbe disease in question, this process having the effect of producing a mild attack of the disease, which protects against a future fatal attack.

(2) The method used by M. Pasteur in rabies (hydrophobia), consisting in the injection of a mitigated virus into a patient already attacked by the disease, in order to overtake the natural virus, acting at full strength by the influence of the mitigated virus. This method has only been used, so far, in the case of rabies, but has apparently been eminently successful.

(3) The employment of the virus of one comparatively mild disease to protect against a more severe one (such as vaccination), with cow pox virus for small-pox, inoculations with cultures of the micrococcus of erysipelas to eradicate cancerous formations, etc.

(4) The destruction or poisoning of the bacteria which are acting as the materies morbi by the administration of antiseptics or bactericides in the form of drugs, internally or by injection.

(5) The reinforcement of natural means possessed by our systems for combating disease germs. This has been attempted in several ways:

(a) Acting on the theory of Metschnikoff, that the "leucocytes," or white blood corpuscles, engulf bacteria, and destroy them by the injection of quantities of the blood of some animal insusceptible to the disease in question.

(b) Raising or lowering the temperature of the body of the animal attacked.

(c) Alterations of diet, climate, or surroundings.

(d) Injection of what are known as phagocyte invigorators, i. e. substances which assist the leucocytes in their engulfing action.

(6) By the injection of the "toxalbumens" formed by the bacteria growing in artificial pure cultures, as has been done by Koch in the case of tuberculosis.

The bacilli of tuberculosis were observed to stop growing after reaching a certain point of growth on blood serum in tubes, in a way that could hardly be explained by exhaustion of the nutrient properties of the serum. The explanation of this cessation of growth is that the bacilli in growing produce a toxic substance, which is inimical to their own life. This substance may be dissolved out of the cultures, by means of dilute glycerine, and the solution used as an injection for tuberculosis, killing the bacteria within the patient's system.

Let us examine the question further with a view to ascertaining why these different methods are not complete successes. The expectations formed of Koch's injection treatment have not yet been fulfilled, and although many seeming cures, or at any rate many preventions of imminent death, have been brought about by its means, it will certainly never be universally adopted in its present form. The evidence, as far as it goes, seems to indicate (see Professor E. Ray Lankester's Advancement of Science) that Pasteur's "overtaking treatment" in rabies has been almost ideally successful; but this cannot yet be definitely affirmed, for the reason that in the statistics of rabies an enormous number of undoubted cases must be collected before the arguments of Pasteur's numerous opponents can be overcome. Protective inoculation in the case of anthrax (which attacks nearly every warm-blooded animal) may be employed with almost mathematical certainty in the laboratory, yet is not so easily employed on the commercial or rather agricultural scale.

Much has been done in this direction, but something still seems to be wanting. It may be that this is in the principle involved, but it is more likely to be found in technical detail. Indeed, it seems probable that we have arrived at one at least of the various possible methods of protection against infectious disease. Now, does the failure to produce immunity with certainty in the case of a non-recurring disease, or the failure to cure in the case of diseases which may recur, or which are chronic, mean that bacteriology will never be of practical use to the human race? Or does it only mean that we have arrived at a condition of knowledge at which we will remain almost at a standstill until the elucidation of certain facts puts us again on the track? Happily, the balance of evidence is in favor of the latter supposition. Is it possible that we have arrived at such a degree of certainty with certain non-pathogenic micro-organisms without being able to extend that control to bacterial life within the animal system? When the ingenuity of man has arrived at the point of being able to prove absolutely that organisms, completely invisible to all but the highest magnifying powers attainable, cause each its particular infectious disease; when these tiny things may be made to grow like plants in a garden, separately and in order; when we can keep rows of tubes each with its deadly contents on our laboratory shelves, or in our incubators, like druggists' bottles of inert powders and crystals, surely we shall not stop at this stage in our control over this "world of the infinitely little." The unknown factor required to make any treatment consisting of an attack on bacteria growing in and causing the illness of an animal or plant practically applicable is something in the technical details of the process—whichever of the various methods is adopted.

PROTECTING COLOR IN ANIMALS.

From Blackwood.

Where lichen-covered tree-stems are common, we find lichen-colored caterpillars, moths, and other insects. A pretty moth (Cleora glabraria), not uncommon in the New Forest, is white, dusted with black, and its larva, which feeds upon lichens, is of the same color. Some years ago, while collecting insects in that locality, I found in the same tufts of lichen a small black-and-white spider just as closely resembling the lichens.

It is supposed that these various color resemblances have been brought about by the need for concealment. A caterpillar frequenting lichens, or a bird living among leaves, would be greatly advantaged by a color resemblance to their several surroundings; hence variations in the required direction have escaped destruction, and there has been through long ages a gradual perfecting of the resemblances. This is the most generally received explanation; it accounts also for the coloration of animals like the spider, to which I have referred, which do not so much need protection from their enemies as a disguise with the help of which they can steal upon their prey.

We must, however, guard against taking generalities for granted without a careful examination of the several cases. Many years ago Messrs. Kirby and Spence called attention to the resemblance between lichen-feeding insects and their food: "Many of the mottled moths, which take their station of diurnal repose on the north side of the trunk of trees are with difficulty distinguished from the gray and green lichens that cover them. Of this kind are Misella aprilina and Acronycta psi. The caterpillar of Bryophila algae, when it feeds on the yellow Lichen juniperinus, is always yellow; but when upon the gray Lichen saxatilis, its hue becomes gray. This change is probably produced by the color of its food." The last sentence contains a most noteworthy suggestion, which may help us in explaining many similar cases of coloration in a much simpler way than by natural selection or natural elimination. It is well known that the pigments which are often the cause of the colors in animals, and always, except in the case of white, of plants, are extremely resistent to chemical action. Some of these pigments will pass unscathed through the strongest acids and the most powerful alkalis. It is quite conceivable, then, that they will be equally unaffected by the chemical action of an animal's digestive juices.

There is, however, no need at all for theory upon this point; it has been shown to be the case in several instances. Dr. Eisig found in the Mediterranean a species of worm living in the interior of a sponge. The sponge was a brilliant yellow, the color being due to particles of a peculiar pigment deposited in its tissues. The worm was also yellow, and it might be supposed that this harmony had been brought about by the necessity for concealment. An inquisitive fish poking its nose into the interior of the sponge, in search of the various small creatures which constantly take up their lodgings in such a spot, would pass over the "protectively colored" worm, and select one that was obvious on account of its different colors. It was found, however, that the color of the worm was merely due to particles of the coloring substance of the host, which had passed out of the intestine of the worm into its skin.

IMPROVEMENTS IN BEDSPREADS.

From The Detroit Free Press.

"I see," said Snaggs, laying down the newspaper he was reading, "that paper quilts are being manufactured and are used extensively, giving good satisfaction."

"That's a scheme," remarked Boggs. "When a man is too poor to take a newspaper he can read his quilt. I suppose they will have library quilts after awhile, with one of Dickens's novels printed on them. Great scheme, isn't it?"

"That's nawthing," said a man with a Wild West accent; "I mind stopping at a tavern in Oregon where the landlord gave us a tallow dip to show us to bed.

"'Ye'll find yer breakfast spread for ye fust thing in the mornin', gentlemen, he said, as we wished him good-night; 'eat round the edges, but save the middle if yer can.'

"We asked him to explain, and he showed us the comfortable on our bed. It was a big buckwheat cake the size of the bed, and as light as a sponge. We breakfasted off it without getting up."

Somebody threw a bootjack at that moment, and the Wild West accent ceased to accentuate, and the truthteller went home.

FROM BEETS TO SUGAR.

EXPERIMENTS WITH THE NEW INDUSTRY IN NEBRASKA.

MEN OF SCIENCE AND PRACTICAL FARMERS ALIKE DEEPLY INTERESTED IN THE WORK—THE LAND OF THE STATE ADAPTED TO PRODUCE BEETS RICH IN SUGAR—TAKING HOLD OF THE BUSINESS IN EARNEST—THE NECESSITY OF CAREFUL TRAINING.

Lincoln, Neb., Jan. 20.—It is only within the last few years that Americans have taken particular interest in the sugar-beet culture and the manufacture of beet sugar. But since it has been satisfactorily demonstrated that sugar-beets can be raised successfully in this country, affording a wider margin of profit than any other agricultural product, there is every indication that the new industry will soon be a leading one in America.

There is no reason why this country should not manufacture all her own sugar and keep at home the $130,000,000 that is annually expended for the imported article. It is estimated that the present annual consuming capacity of the United States for sugar and molasses is 2,000,000 tons, or about fifty-five pounds per capita. There is spent each year for sugar $150,000,000. By far the greater amount is imported from Germany, France and Austria. Since the adoption of the McKinley bill, by which the Government offers a bounty of 2 cents per pound for all sugar produced in the United States, the home industry has been encouraged, the production increased, and as a result the price lowered 2 cents per pound.

America has the capital, land and climate to make her the greatest sugar-producing country in the world. The beets raised in the United States show a higher coefficient of purity than those raised in any other country in the world. Extensive fertilization is required abroad to secure a yield of beets with a sugar content of 12 per cent. The proportion of sugar to the weight of the beet has ranged as high as 21 per cent in samples analyzed in this country, while 16 per cent has been the average. It is profitable to raise beets in Europe whose coefficient of purity is 12 per cent, and a 14 per cent average pays in America. By a process of selecting and breeding, beets will undoubtedly be produced within a few years that will yield an average of 20 per cent of saccharose. In 1820 the yield was only 5 per cent of sugar, and ten years ago 10 per cent was the average. Every per cent means an increase of about twenty pounds of sugar to the ton of raw beets, and a consequent decrease in the cost to both producer and consumer.

SCENE IN A BEET-FIELD.

COST AND RETURNS.

The average profit on corn is from $5 to $7 an acre to the farmer, while the profit on an acre of beets ranges in the West from $30 to $40. The average cost per acre for raising the beets in Nebraska in an ordinary season, where all labor is hired, is shown by the following:

Ploughing, 10 to 12 inches deep	$2 00
Harrowing and rolling twice	1 50
Seeding	35
20 lbs seed	2 00
Thinning out beets, including first hoeing	5 00
Hoeing same twice	7 00
Cultivating same four times with horse cultivator	3 00
Total cost per acre	$20 85

Adding to this $1 per ton for harvesting and delivering, including 30 cents per ton for freight. A yield of fifteen tons per acre and an average of 15 per cent of sugar, at the present scale of prices, would bring $67 50, leaving a profit of $31 65 per acre. In a favorable season the cost of production would be reduced, the yield would be sixteen to seventeen tons per acre, with 15 per cent of sugar, and the profits would, of course, be proportionately greater. Many of the farmers do their own cultivating, and the profit is then increased fully $7 per acre. The factories return free to the growers the beet pulp residuum, which is an excellent fodder for sheep and cattle.

Labor in Europe is cheaper and more efficient than that in the Western States, but the invention of new machinery in America last year will decrease the dependence of the grower upon the field laborer. The field labor of the West is high, scarce and inefficient, but the majority of growers do not hire all their labor, and in competition with the foreign work the disadvantage in the one case is more than compensated for by cheap horses and fodder and an abundance of rich low-priced land that obviates the expense of time and money for fertilization to make it productive. The machines for pulling up the beets and cutting off the tops do the work as effectually as hand labor. The weeding is mostly done by single-horse cultivators that cultivate and keep clear of weeds both sides of four rows of beets, leaving only the space immediately surrounding each hill to be hoed by hand. Over three-fourths of the weeding is done by machinery, and much more economically, if indeed not better, than if done by hand. Probably the field labor in this country costs about three times what it does in Europe. The highest price paid in Nebraska is $1 50 per day, while the ordinary price is $1 25 per day, or $18 a month with board. In California the usual price for labor is $1 50, although as high as $2 is paid. Much of the work of thinning can be done by boys, whose wages range from 50 to 75 cents a day, or who are paid at the rate of 50 cents per mile for each row, amounting to about $2 75 per acre.

Within a few years this country will undoubtedly be wholly independent of foreign countries for her sugar supply. France, Germany, Belgium, Austria and Russia have been successful in the manufacture of beet sugar under circumstances not so favorable to the industry as those which exist in the United States. There are other objects to be gained beside the home supply of the commodity. The culture of the beet is beneficial to other forms of agriculture. The leaves of the plant left upon the ground return to the soil most of the original constituents, while the condition of the surface is greatly improved for sub-planting. It has been noted that the succeeding crop is increased 33 per cent. Farmers have an opportunity to diversify the crops, and the risks of loss during an unfavorable season are greatly diminished. Wherever factories are established the community receives a great benefit. From 200 to 300 hands are employed during the eighty or ninety days each year that the factory is running, and in the refinery a force is employed throughout the year. Besides utilizing labor, the indirect advantages are not the least. An impetus is given to other forms of industry in the locality, and other factories necessarily follow to supply the increased demand for other necessities. Machine shops and coal and iron mines drawn upon by the new industry increase the demand for labor and contribute indirectly to the National prosperity.

SOME PRACTICAL EXPERIMENTS.

The important investigations made at the experiment station here, in the State University, have been of the greatest value to producers and manufacturers. The reports on experiments in the culture of the sugar-beet by Professors Nicholson and Lloyd contain the most valuable information on the subject yet contributed. The work which was involved before the preparation of the bulletins was made possible necessitated an enormous amount of labor. The director began the experiments over two years ago, and through the co-operation of the Bureau of Labor and Statistics the valuable data were collected. The seed which was obtained from the sugar-beet districts of Europe was contributed by the Department of Agriculture, and distributed from the chemical laboratory to farmers in all parts of the State. All samples of the beets received at the laboratory were carefully analyzed, and accurate information based upon the experiments was obtained. The varieties of seed best adapted to Nebraska soil were determined, and also the conditions favorable to successful cultivation. The same experiments practically were repeated the following season, the work was extended into every county of the State, sub-stations were established at convenient distances on the main lines of the principal railways, and co-operations formed with agricultural societies and individual farmers throughout the State. The location of the sub-stations was determined by accessibility and by the finding of a sufficient number of enterprising men who would agree to cultivate the beets in accordance with directions given. Field agents appointed from among the students in the chemical laboratory visited the stations at regular intervals to see that directions were carried out, and to collect and forward specimens of soil and samples of beets to the laboratory for subsequent analysis. Arrangements were made to facilitate the work in every way, and to enable the authorities to reach definite conclusions in regard to yield, cost, effect of soil climate and cultivation upon the ratio of sugar to other substances in the beet. Fully 2,000 farmers were supplied with seed, and circulars giving directions for cultivating, and a list of questions thereupon to be answered and sent to the laboratory with specimens of beets. Over 500 farmers sent beets for analysis, the experiments in cultivation covering an area of more than 75,000 square miles. The analyses were all made in the university laboratory under the supervision of Professor Nicholson or Associate Professor Lloyd. A great deal of time and hard work were devoted to making most careful analyses of the numerous specimens. The beets must first be sliced longitudinally to get a uniform percentage of sugar. The slices are then grated and the juice entirely pressed out. The juice is analyzed by the aid of the polariscope and the Fehling solution. The percentage of saccharine matter in the beet is ascertained, and throughout the analysis the most careful and skilful work is necessary. An entirely different process is followed to ascertain the relation between the kind of soil in which the beet was grown and the beet constituents. After the beets are sliced and dried they are reduced to a powder, burned in the crucible and the ashes analyzed. The work has been done mostly by the advanced students, and the results obtained are valuable. Experiments were made upon growing crops to determine in what stage of ripeness the beet possesses the greatest amount of saccharine matter. Samples of each variety grown at the college farm were pulled up at intervals of a week apart, and the analyses compared.

WORK IN THE BEET-FIELD.

The reports received from farmers in regard to climate, cultivation, etc., together with the analyses of hundreds of specimens, show that the varieties known as Klein Wanzlebener, Vilmorin, and Desprez have given the best total results. The analyses show a per cent of sugar ranging from 1 to 23.2. The best variety for sugar industry is not the large porous roots, but the small, compact, firm and tapering root, which requires careful cultivation. Early summer rains, followed by a hot, dry season, are found to furnish the best conditions for securing a good crop, and a porous, sandy soil, with a surface not likely to hold water for any length of time, is essential. The matter of cultivation is not as simple as in the case of beets as of corn. In the former case it amounts to gardening on a large scale. The land should be ploughed in August, in order to kill the weeds, if possible, and to prepare the ground for the crop the following season. The surface ploughing, consisting of a slight stirring up of the upper layer of soil, is to be followed by the use of the subsoil plough, which breaks the under soil without interfering with the surface. In the spring the ground is ready for the harrowing as soon as the soil is dry enough to crumble readily, and after the rolling, which is for the purpose of bringing moisture from the lower soil to the surface to facilitate germination, the seed should be planted. Since the time and depth of planting and the distance between the rows and hills affect the yield and quantity of the harvest, the utmost care should be given to this part of the work. The time of planting depends largely upon the kind of season, and while middle of springtime generally brings forth best results, the only guide is the intelligence of the farmer, who must use his own judgment as to when the soil is warm enough to allow the plants to come through within six or eight days. The seed should be planted at a shallow depth, from three-quarters of an inch to one and one-quarter inches. It has been ascertained that the largest sugar content is obtained when the distance between the rows is about sixteen inches and between the hills about ten inches. Whether the method followed in planting has been by drilling continuously, as in the case of wheat, or in hills, as with corn, the thinning process is always necessary and should follow closely upon the second hoeing. Several hoeings are also recommended. There is a saying in Germany that sugar is hoed into the beets, and it has been shown that a plot hoed five times has nearly doubled the yield per acre. After the last hoeing, the soil, if cold or wet, is improved by being hilled up around the plant. The moisture evaporates more readily from the greater expanse of surface thus exposed, and a porous condition is obtained. Precautions are necessary to prevent the destruction of the plants by insects. The most common pests are the garden web-worm, which has a variable species and is common in the regions between the Missouri and the Rocky Mountains, and the beetles. The web-worm feeds upon weeds and garden plants, and is not believed to be a frequenter of fields. It spins a web while feeding, and the larva feeds upon the epidermis of the leaf. The best remedy known is a mixture composed of London purple or Paris green, in the proportion of one pound to 200 gallons of water, applied with a sprinkler or force pump. The small pale flea-beetle, variable in coloring from black to pale yellow. It also attacks the surface of leaves, leaving it with a blistered appearance. There are other varieties of flea-beetles that relish the beet, the soft-bodied blister-bettles, so-called because they blister the hands when touched. The best remedies for the beetles are kerosene emulsion, arsenical sprays, or Paris green solution. True-bugs, leaf-hoppers, cutworms—the young of a group of owlet moths that are nocturnal in their habits, and injurious to all kinds of crops—and wire-worms are among the predatory insects to be fought against. The most efficacious remedy for true-bugs and leaf-hoppers is a kerosene emulsion, while salt, or tar-paper cones set about the plants will be a safeguard against the cut-worm.

THE LAND.

The land needs comparatively little fertilization. The agent most commonly used is lime, and all that is necessary to restore the soil to the original degree of fertility is the addition of small amounts of phosphate, lime, soda and potash. In the matter of beet cultivation the point to be considered is not how to guard against the exhaustion of the soil, but how to obtain the greatest amount of roots containing the most sugar. The constituents of the beet are drawn almost entirely from the air and water, for sugar is composed of oxygen, carbon and hydrogen. In France and Germany the subject of fertilization has been reduced to an exact science, and ingredients are added to the soil according to exact rule. Nitrogenous substances when used in excess cause the growth of enormous beets containing only a small amount of sugar. To produce 50,000 kilograms (110,230 pounds avoirdupois) of beet roots, yielding 12 per cent sugar upon a hectare (2 1-2 acres) the soil must contain at least 60 kilograms (132 1-4 pounds) of phosphoric acid, 100 kilograms (198 1-2 pounds) magnesia, 200 kilograms (440 pounds) potash and 120 kilograms (265 1-4 pounds) of azotic or nitrogenous matter. But all soil contains more or less of these agents, so the full amount given above need not be added. Frequently two-thirds of the above amount is added to the exhausted lands abroad.

The rotation of crops is an important matter for consideration. By a judicious method the fertility of the soil can be maintained, if not actually increased. It is believed that the beet crop should be preceded by wheat, and succeeded by clover, one crop of which is cut for hay and the second crop ploughed under, then potatoes, wheat and beets in the order mentioned. The cereal crop being harvested early, leaves the ground in readiness for the fall ploughing, which is a necessary step in successful beet culture.

Official statistics show that 13,000 acres of land were occupied by the cultivation of sugar-beets last year. In 1890 three factories were in operation, two in California and one in Nebraska, the whole amount of sugar manufactured being 8,000,000 pounds. Last year the number of factories was increased to six, there being three in California, two in Nebraska and one in Utah. Eastern capitalists have been looking over the ground for the best location of other factories, and fully twenty towns in Nebraska have begun negotiations for separate factories. The best location is undoubtedly in the regions where the beets are grown to the best advantage. Utah has been successful in the sugar industry, but it is probable that California will always give more attention to raising fruit than beets, since the former pays better. It will then remain for Nebraska to become the leading State in the sugar industry. Wisconsin and Kansas have become interested in their sugar prospects and licenses have been granted to beet sugar companies in Virginia and Pennsylvania. The Oxnard Company owns the factory at Chino, Cal., and the two in Nebraska. The one just built in Norfolk is at present turning out an average of 50,000 pounds of granulated sugar per day, and has a maximum sum of 350 tons of beets per day. The main building is 100x300 feet in dimensions, and is built substantially of brick. The main room on the ground floor is the manufacturing room, in which are the slicing and diffusion mills, classifying and carbonation tanks, vacuum pans, centrifugals, juice pumps, engines and other essentials for use in the manufacturing process. On the same floor are the wash-room, filter-rooms for purifying the syrup, lime-kilns, and further over the packing-room, various offices, and factory laboratory, where an expert chemist determines the coefficient of purity and percentage of saccharine, and tests the alkalinity of the juice after each carbonation. The large drying-room occupies the whole of the second floor, and contains reservoir tanks and drying reels. Adjoining the factory are the boiler-house and the beet sheds. About 2,500,000 gallons of water, which is filtered before being pumped into the pipes, is used each day.

FACTORY OPERATIONS.

Sugar is made by the diffusion process, and the following is a brief description of the operation: The beets, after being weighed and tested, are removed from the bins to huge vats supplied with running water. After being subjected to several different operations during the cleansing process, they are passed up in elevators to troughs in the main room, again weighed and slid into the slicing mill, which cuts them into corrugated strips, exposing the sugar cells. These cossetts are then passed through a chute into the diffusing tanks, where water is sent through them with sufficient force to extract the saccharine quality. The pulp is passed into a machine which presses out all the water, while the juices are conducted to the carbonation tanks and mixed with the milk of lime to counteract the effect of the native impurities. Carbonic acid gas from the kilns serves to solidify any excess of lime in the mixture. The juice is then passed successively through a series of filters, a second carbonation, and undergoes a further clarifying process. It is then ready for the condensation boilers, and after the syrup is boiled it is carried from the evaporation tank to the centrifugal machine and crystallizing apparatus. The sugar purity ranges from 99.5 to 99.85, and the quality produced is the extra fine granulated.

BEET-SUGAR FACTORY, NORFOLK, NEBRASKA.

Samples of beets were received at the Agricultural Department from a number of the States, and the samples from Nebraska showed the highest coefficient of purity.

The first convention ever held in this country in the interest of the beet sugar industry was called by the Lincoln Board of Trade, December 17, at Representative Hall, and between 200 and 300 enthusiastic farmers and business men were in attendance. A permanent organization was formed under the name of the "Nebraska Beet Sugar Association," whose object is the promotion and encouragement of the new industry. The secretary of the convention will enter into correspondence with representatives of this Government in Germany, France and other beet-sugar producing countries regarding the most successful mode of growing beets, prices paid by manufacturers, and for further information on the subject.

The failures in the past to carry on the manufacture of sugar in this country with any marked degree of success are largely due to the ignorance or inexperience of superintendents and workmen. Unlike many enterprises, something more than energy, perseverance, or even capital, is necessary to make the sugar industry a success. Only trained and experienced men need expect to manufacture sugar of a good quality, or to escape financial loss in the undertaking. The importance of establishing sugar schools in favorable localities can scarcely be estimated. The sugar schools in connection with the experiment stations in France and Germany have practically made the sugar industry in those countries. The first school of the kind in America was opened January 5, under the direction of the experiment station at the University of Nebraska. Forty applications for entrance have already been made. At present the authorities select from the courses and give thorough instruction in the chemical side of the beet sugar subject. During the summer special training in the agricultural side will be added, in connection with the practical raising of beets at the State farm. All that is needed thoroughly to equip the school for instruction in every branch of the industry, from the raising of the beets to the final preparation of the sugar for market, is a miniature factory. It is not the intention of the university to go into the manufacture of sugar for commercial purposes, and the factory would only be a piece of apparatus in the hands of the director of the station. Its relation to the sugar school would be that of a laboratory to any department of instruction in a university. With this important addition, experiments in each department might be conducted that would serve the twofold purpose of benefiting present producers and manufacturers and giving a thorough education to prospective growers and manufacturers. It is of importance that men should be engaged in the work who are thoroughly trained in all the processes of beet-sugar production, and who will report the results of their work honestly for the interests of all concerned, from the beet raiser to the sugar consumer. It has been difficult sometimes to obtain the information most needed. More or less valuable reports are received from the factories where experiments in the different processes are made, but it is not to be expected that these reports will be absolutely complete, or that they will not be somewhat one-sided. The manufacturer has his own interest at stake, and it is only fair to presume that he will report only such discoveries as are of equal interest to the beet-raiser and the sugar-manufacturer. If the experiments resulted in discoveries to the interest of the grower and consumer, and against the interests of the factory, they would never be published.

The university authorities have asked Senators Manderson and Paddock to work for an appropriation of $50,000 for the erection of a sugar factory at the university under the control of the experiment station. The general feeling in Nebraska is that the work at the station is entitled to Government recognition and support. The work cannot be carried on successfully if the school is handicapped by lack of funds or subjected to outside interference in any way. The success of the beet sugar industry in the West is largely due to Professor Nicholson, of the State University, the best place for the school which must sooner or later be established by the Department of Agriculture. All that is definitely known concerning the culture of the beet in America, as ascertained by experiments in accordance with scientific methods, was learned at the University of Nebraska.

THE LITTLE MISERIES OF WAR.

WHAT THE VETERAN SAYS ABOUT THEM.

Somebody, I forget who, says somewhere, "A genius, sir, is a man who would have done great things if it hadn't been for little things." Which is why, perhaps, "with a field marshal's baton in my haversack" (if you believe the first and only Napoleon), in four years of toil and fighting I got "no forwarder" than sergeant major. Queer place to keep a marshal's baton by the way, in among the cold pork and crumbs of all creation, not that we had any field marshals in our big war, though sticks enough for seven Frances. The kind of little things I mean are the very kind little Ralemy Walse meant when we heard the poor boy composing himself to sleep on the top rail of the fence, in the rain—out of the mud though—with sobs as big as he could well hold, and now and then a moan of "Wish't I was in my grandfather's pigpen." Yes, they tell you of the glories of war and even of the horrors of war, but who tells you of the unbearable little miseries of war that make you dream of your grandfather's pigpen as a very paradise of comfort and cleanliness?

Which would you rather not be, wet, or dirty, or hungry? Or cold, for instance? Or hot as capricorn and capsicum? Prefer mud or dust to walk in or sleep in, as a steady thing? Which is your favorite domestic insect, the agile flea, the logy blow-fly, or the ever over sociable serpent? You volunteer for the war and you take your choice. Or you may have them all with my share thrown in. That is if there's anything left of my share after my enjoying four years of it. The wettest way of getting wet and staying wet, I contend, is mud; though whether Virginia mud or Louisiana mud, for choice of samples, I should not like to say off-hand. One is so deep and sticky where the other comes so greasy and slippery. In the "sacred soil," where it is a bit dampish, are cunning roots, single or in meshes, and over it bristles a thick beard of black-jack and the dwarf "yalla" pine, to which add the obtrusive, unmannerly blackberry, every spray pointing stiffly at your eye, and the trailing dewberry curling gently about your unprotected ankle—well, tastes differ, but when, and if, you get "out of the wilderness" you are indeed lucky if the first thing you see isn't the funny man of the company, with rather less clothes left than you, and rather more scratches added upon the visible surface of things, eagerly asking "How is the walking?" or, like me, you may get to be a sergeant-major, or that sort of thing, and have to take these delights a-horseback, for your sins. No crawling under then: no dodging the difficulties and tangles, but at them and through them you must just push and flounder until haply you come to daylight in an entrancing "open" where the quicksand is wherein three tiers of mules, wheel and swing, and bodies of wagons to match, bear hidden witness to misplaced confidence. Moral: Tread not where no track is. As the tactics say, even the new ones, "This remark is general for all the deployments." Or if the odors of the bayou, many and powerful, be pleasing in your smell, and the "blob" of the moccasin, as it slips before your eyes from its roost among the Spanish moss into the reeking swamp (where you are, or at least your legs are) hitherto unwaded by man, be as music in your ears,—why then, take mine and welcome. Where the moccasin slips, there skip I. I prefer pigpen.

I have said, I think, that mud is wetter than water. I can't prove it but you can any time you like. The wetness of water dries sooner or later, generally later "in the army"; but the wetness of mud does not even dry later. Let it once penetrate the pores or seams of an army boot or shoe (and army boots and shoes are carefully made all seams and pores) and farewell, a long farewell, to dryness. Soggy they are and soggy they must remain until the sole flakes off in mouldy patches like an evil undercrust of "baker's" pumpkin pie; or the upper "gives" and buckles in melancholy rents, like last winter's bark on a rotten birch. And not the least or the most endurable of these little miseries of war abides in the army shoe. Or boot, if you please, for these be twin evils, born of a time though not of a size, and like the famous "two roads to Raleigh" in the tale, whichever you choose, you'll wish you had "done tooken the other." Boots are bigger and harder to get into or out of; reciprocally, shoes are smaller and easier for assorted rubbish to get into—but not to get out of. Oh, no; no collector of distorted curios parts more reluctantly with his pet monstrosities than your army shoe when once it has taken on the craze for gathering strange twigs, roots, vines and rare volcanic remains at the gaping ankle well to store them snugly in the close crypt beneath the big toe for future cataloguing. Boot of all evil—shoe of an infinite malice—away! Better than no shoe or boot? It might be, but for the maker's private and confidential peg deftly placed to tap the very nerve in your favorite toe that winds twice around the roots of your eye-tooth. One April day in '65, by Appomatox, in the last bog before the end, I shed the second half of my last pair and so went gladly barefoot to or toward the great review. A final bit of fun on the part of your army boot and shoe maker is that as to sizes he is all things to all men. If your No. 8 foot cannot go with a No. 11 nor yet with a No. 6 boot, blame not the boot. They "come so" in the box. You might as well expect your hatter to fit his hat to your head. No roof no house; no foot no soldier. True, yet not as your shoemaker shall conceive. His but to make (and sell) them by the box—pegs and all. They come so in the box.

As to roofs: Nothing would do but we Yankees must imitate the French of the Second Empire in all things from bonnets to bugles, and round again to their "tentes d'abri," the shelter tents of our woe. In desiccated Algeria they were a good enough sirocco-proof; in Europe a good enough shelter for the luncheon hour, with villages and farms as thick as haystacks in Maine for the night's lodging, or the week's. In summer, wind. Nobody thought of four men living though the whole variegated North American year under four napkins, until we did. It came in with that mean unmeaning nubbin of a head-covering the "kepi," and seeing how unfit either was, or both were, straightway we "adopted" both and took them to our bosoms. How would you like to spend the winter, this winter, Now, on the Palisades, say, or among the Jersey flats, with nothing over you save a quarter interest in four napkins? In four napkins buttoned together while buttons abide and before buttonholes are grown to slits? Napkins that smell of old tallow when they are new, and when they are old of new mildew! Which let in the rain, and through the wind, at all ages. Meant for four men, each man carries a quarter section on his already overloaded back, yet in truth the wretched things fit no conceivable number of men. Just fancy one man flocking, like Lord Dundreary's bird, all by himself under one quarter section of this napkin arrangement. His face might be covered. Two men; their legs or heads go bare. Three; 'tis not to be thought of; a very nightmare. Best of all, five men, then one of these lends his napkin for a stop-gap or wind-break at head or foot, and all five are as little comfortless as the thing allows. Unless, indeed, one of you five be sent "on post," for instance; in which case you need no longer give notice, with public outcry, when the root under your rib or the rock that frays your eyebrow compels you to turn over in bed, as for politeness we will agree to call it. Then, too, you may achieve the strange luxury of two blankets under and three over, five under, none over, five over, none under;—or any combination of these elements that suits your fancy, the weather, or that portion of the earth's surface we have, in sheer courtesy, called your "bed," is "made." As for this talk of rolling yourself up in a blanket—a, mind you, a blanket, one—well, suppose you try it to-night, in the backyard, for instance, or on the roof, or in the nearest pigpen.

Guard-duty too. That's a nice sensible comfortable business for a respectable youth to be engaged in, o' nights. Two hours on and four off. Eight hours in the twenty-four to be spent in "walking post," doing nothing, watching everything, or watching for it, which is worse. One of the stoutest hearts I ever knew confided to me that being "on picket" the night before Palo Alto he plainly saw four hundred thousand Mexicans with knives between their teeth creeping on him through the wavy rustling grass, every seven minutes. If you see nothing, or nothing but the dark, first it gets larger; then it gets smaller; then it swells again; then you wake up with a start and drop your gun, lucky if it be not on the grand rounds too, which means shooting at sunset, and you the shot. In camp or barracks, it is well enough, perhaps, because its only one day in three or maybe four; but what about the march? Reveille at 3 or 4; breakfast at seven menutes past; march (nominal) quarter past; high standing around till 6, 7, 8 or more, before actual march; halt at 10, 11, 12, 1; then detail for picket duty Private You." Somebody must of course. Yes, but "the thing of it is," 'tis You. Wouldn't mind if it were Private Thomas, Richard or Henry. If you don't like that how do you like reveille three hours after taps and march again at cold o'clock in the morning, in the sickening soak and suck of the slush? All this, with hunger to boot, we enjoyed in the holidays, the jolly days, under "Stonewall Jackson's chief commissary," the sovereign infallible Pontiff John, whose headquarters were in the saddle until it didn't much matter where they were. Before that we used to feel sorry for the poor Johnnies (as we called the Confederates), for having to march so far and fight so hard on roasting ears and nothing; but better is a roasting ear than a cold stomach. We boys found that out in "the Second Bull Run."

Have I got through with my little miseries? No, young sir, I have not. Only just begun. Would I enlist again? Yes, if they would have me, and my old woman would let me go, and—and that sort of thing. But you boys are coddled so you don't know what fun it is. How do you suppose we old veterans stood all these little miseries and a score more I haven't got alongside of? Why, how else but by the saving grace of a good practicable grievance? When it isn't the Government it's the general or the colonel or the captain, or, best of all, "that there black blanked adjutant yonder." Lay it all to him and let him lay it to the sergeant-major if he likes. Nothing like having some one else to lay it to. Adjutants for choice. Oh, there's nothing half so sweet in life as love's young practicable grievance.